Better Homes and Centers

Michigan Department of Social Services

Science: Part II

Issue 19 Winter 1989

RAW MATERIALS FOR ACTIVE LEARNING

Marjorie M. Kunz, Teacher
Flushing Parent/Child Nursery
Genesee County

Children learn to think through active experience with real things, real people, and real places.

Natural materials are ideal. Young children have always been intrigued with water and sand; with all sorts of pocket-size collectibles; with things adults may consider valueless. Here is high motivation for both the shy and aggressive as well as all those in between. Our approach is gradual, starting with the simple and moving to the more complex activities. In the case of waterplay, we merely begin with washing dishes, then washing baby dolls, then pouring (a basic activity). Do you remember how much practice it takes to learn that full is full?

We can combine science, art, cooking, vocabulary building, math, self-help and independence. Sand and water change with every touch, preventing the feeling of powerlessness often built into commercial toys. Success is built into these familiar inexpensive materials. They fill a child with good feelings, intellectual and social activity.

Prepare a little "Wonderspot" in your center where items from nature are available for examination and experimentation.

Spark up your midwinter program with simple experiments. Wear a special apron as a signal to the children that you are going to try some of the following activities. Be prepared to do them over and over again as children show interest. Use descriptive words to enlarge vocabulary and increase language usage. Be careful to focus on the idea that the changes you observe are natural and not "magic."

Materials for Waterplay

- *Water table or wading pool, plastic basins and tubs.*
- *Variety of plastic containers, squirt bottles, pumps, measuring cups and spoons.*
- *Tin Cans with nail holes — around the bottom, up the side. (Be careful of sharp edges.)*
- *Cut sponge hands and feet (held on with elastic for making wet prints and cool feet).*

(Continued on page 2)

DIRECTOR'S CORNER

The heating season produces dangers which are not generally present during warm weather. Some of these dangers have a direct impact on children in day care.

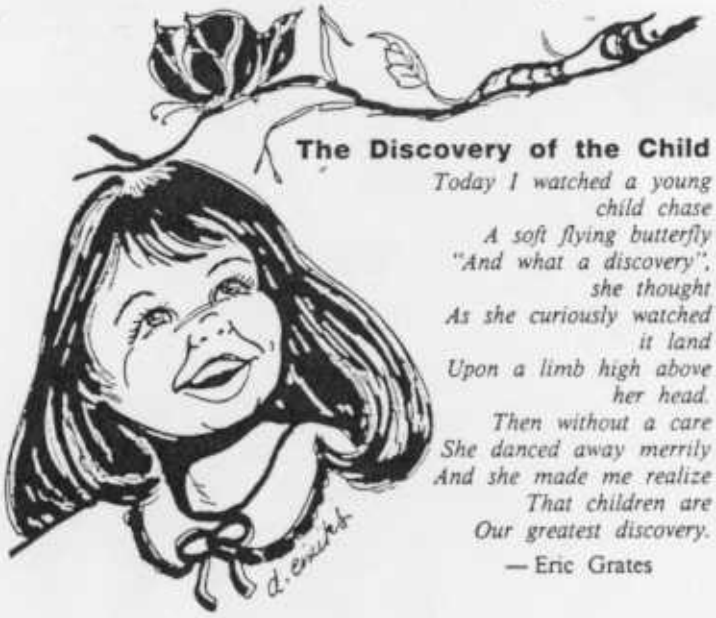
Heat producing units are the number one cause of fires in homes. I cannot emphasize enough the importance of taking preventive action through the proper installation, maintenance, cleaning and inspection of heat producing units.

Wood burning stoves are heat producing units that must be properly installed, inspected and protected. Regardless of whether or not a wood burner is used while day care children are in care, it must be inspected by an appropriate authority. The Department will accept proof of proper installation from a Department Qualified Fire Inspector, the home owner's insurance company, local building inspector or other certified fire safety inspector.

Heat is retained by wood burners for a long time following their use. Therefore, even though a wood burner is not used while children are in care, a barrier is required to prevent young children from touching it.

The minimum time and expense it takes to insure proper installation of a wood burning unit as well as the proper maintenance of any other heat producing unit in the home will help to prevent tragedy.

Ted deWolf, Director
Division of Child Day Care Licensing



The Discovery of the Child

Today I watched a young
child chase
A soft flying butterfly
"And what a discovery",
she thought
As she curiously watched
it land
Upon a limb high above
her head.
Then without a care
She danced away merrily
And she made me realize
That children are
Our greatest discovery.

— Eric Grates

Raw Materials . . .

(Continued from page 1)

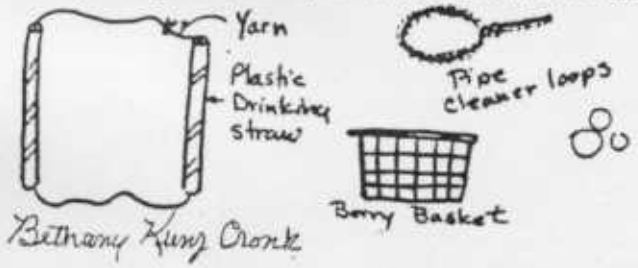
- *Rubber gloves with holes cut in fingertips.*
- *Waterwheels made from wooden spools with plastic blades cut from milk containers.*

Winter Fun

- *Lay a wet item of clothing (T-shirt, sock, etc.) outside for a half-hour on a freezing day. Bring inside for children to feel.*
- *Fill a wading pool or tub with snow and bring inside. Squeeze bottles of thin paint onto the snow.*

Bubbles (Sequential planning is important)

- *Begin by having young children blow cotton balls across the table through straws. (One straw per child. No sharing.)*
- *Blow with straws into cups 1/3 full of soapsuds. Let them bubble out of the cups onto the table. Provide sponges for clean-up.*
- *Dip plastic berry baskets in a flat pie pan of soapy water. Blow and blow and blow.*
- *Make circles, triangles, squares and other shapes out of pipecleaners or twisted telephone wire. Dip and blow. Notice the prisms.*
- *Cut the bottom out of a Pringle can or paper cup. Blow gently through the top.*
- *Watch for enclosed shapes to experiment with. Connect two straws with string, dip and pull up for large elongated bubbles.*
- *Older children may wish to try hula-hoops or other large rings to pull up a bubble around themselves.*



Water Magnification

- *Put a spoon in a glass of water for observation.*
- *Put a penny in a glass of water.*
- *Make a magnifier from small plastic bucket or gallon containers. Cut 2-3 holes in the sides for moving objects in and out. Cover top with secured plastic wrap. Put wet stones and other objects below for observation. Try oil instead of water for distortion.*

Hot-Cold Balloon

- *Fill 2 tin cans half full of water, one hot, one cold. Put a small balloon (long ones are great) over the top of a small bottle. Move the bottle back and forth from hot to cold. What happens?*

Shiny Pennies

- *In small glass or jar put ¼ c. white vinegar and a couple of spoons of salt. Drop in dirty pennies and stir.*

Cornstarch and Water Squeeze

- *Place 2 cups cornstarch in plastic bowl. Add water gradually to dough consistency. Grab by handfuls and squeeze (feels dry). Open hand and watch it ooze through fingers.*

Color Explosion

- *Place an inch or two of whole milk in a plastic dishpan. Drop dots of food color on top (at least 3 colors). Drip dish detergent down edge of dishpan. Observe the swirling colors.*

Soap-Pepper Push-Pull

- *Sprinkle pepper or broken toothpicks on water. Break the surface of water with a small piece of soap held in the hand. Watch the pepper move away. Try sugar instead of soap. What happens?*

We begin to build concepts in a setting that beckons children. If we don't interfere too much they will follow their own inner timetable. We can be facilitators; the guide on the side rather than the sage on the stage. Answers may change as knowledge grows, but questions will always be necessary. Sometimes we teach best by not supplying all the answers.

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THE DRAMATIC PLAY AREA: IT'S NOT JUST HOUSEKEEPING ANYMORE

Sheila Trainor, Manager
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Why bother with science? For one thing it can't be avoided. Science is everywhere in a child's world. We have a tendency to think of "science" as "experiments" set up and taught by adults. With a little imagination and careful planning, science activities can be successfully incorporated into the total program including the dramatic play area.

The following are examples of ways we included scientific elements in the dramatic play area during the past year to enhance child participation and learning:

Eggs and Chicks

- After a trip to a bird farm we set up an incubator with several fertilized eggs. Children kept a chart of changes observed in the eggs and discussed how to keep them warm should the power fail.
- Materials in the center included posters of different bird eggs and chick development inside the egg; egg dyes and equipment; nesting materials (paper strips, boxes, yarn, etc.); and art supplies.
- Children built nests and pretended to be birds hatching eggs. They also pretended to be baby chicks and took turns hatching, growing, and scratching for food.
- Children constructed eggs out of various materials and real eggs were dyed to look like wild bird eggs.

Indoor Garden

- We filled the water table liner with potting soil. We provided sun hats, seed packets, watering cans, plastic garden tools, strings and stakes, row markers, books and art materials.
- Children learned quickly that planting is a sequential activity. Having one person cultivating while another is planting and another is watering led to many lost seeds. The children thought through the steps in the process and worked out a "division of labor" plan for who would handle which job. The result was definitely a "mixed medley" of vegetables. Then we went on to learn all about the need for and process of transplanting!

Caterpillars to Butterflies

- We provided three containers of caterpillars (food and all) obtained from a science product mail order firm. We stocked the area with pith helmets, butterfly nets, magnifying glasses, yarn, string, tissue paper and other art materials, pillowcases and books. Children used the pillowcases as "cocoons" and then emerged. They stalked and caught imaginary butterflies. They imitated the way butterflies drink nectar and mimicked the flight of butterflies. They created butterflies out of collage materials. They kept a record of changes in the real butterflies.

  Placing the incubator, the "garden plot", and the caterpillars in the dramatic play area rather than at a science table, and stocking the area with props and materials, facilitated the blending of science learning and pretend play.

Remember that science is everywhere. Look around and you will soon discover many other ways to enrich your dramatic play area through science. Here are some important points to keep in mind:

1. The caregiver is a stage-setter, listener, and support person.
2. A wide variety and sufficient amount of props and materials are necessary.
3. Planning is essential to ensure the availability and appropriateness of these materials.
4. Activities should develop from the interests and ideas of the children.
5. Allow sufficient time for children to explore and discuss materials, processes and discoveries.

Combining science and dramatic play can give us real insights into the behavior and development of the children we serve.

BLOCKS BUILD MINDS

Patricia Hearron,
Licensing Consultant
Saginaw County

What do you see in your mind's eye when you hear the word "scientist"? Someone in a white coat, perhaps with disheveled hair, pouring foaming liquids from beakers to test tubes? Even those of us who chuckle at this naive image, borrowed from grade-B movies, probably tend to confine our idea of science to natural or physical science. As a result, when we think of science in our programs for children, we think first of paraphernalia: magnifying glasses, microscope, magnets. We think of science as happening in the science corner. But "science" comes from a Latin word meaning "to know," and is more broadly defined as having knowledge as opposed to ignorance. To be a scientist is to try to figure out how the world works, and in this sense, young children are engaging in science for many, if not most, of their waking hours.

The block area, in particular, is one place to observe these budding scientists in their natural habitat. If we watch carefully we might see young physicists investigating gravity, stability, or balance as they stack the various sizes and shapes; experimenting with inertia and interaction of forces as they roll small cars down ramps and bump them into walls; testing concepts of weight and energy as they carry stacks of blocks to the shelves; discovering the properties of matter in the blocks' smooth surfaces or hard edges. We might see geographers constructing maps or other representations of places they have seen or imagined.

If we expand our idea of science to include the social sciences as well, we might see economists figuring out how to distribute scarce resources when there aren't enough long blocks to go around. Young sociologists might build a model of an airport or a hospital, decide on the people they need to run these places, and explore their roles and relationships. Beginning psychologists study the mysteries of human motivation as they struggle with the difference between accidentally knocking down someone's building and doing so on purpose. They practice persuasion when they negotiate with a neighbor to relinquish some of the large hollow blocks they need. As they build and rebuild their small worlds and practice moving about in them, these block players are all anthropologists, studying the workings of a culture that may be commonplace to those of us who have been in it so long, but is still exotic and unknown to their new eyes.

As they practice all these "ologies", children are honing the indispensable skills of any scientists: problem solving, observation, use of trial and error, and inductive reasoning or drawing conclusions based on observations. As their adult counterparts do with computers, they are constructing models of their ideas of reality which they can test and tinker with. Best of all, they are doing all this while they are practicing language, creating art, gaining physical and social skills and learning mathematical concepts.

The word science is also related to the Latin word "scindere" meaning "to cut", but young children don't carve up their experience of the world the way that adults do. They study psychology and physics and art all at once, and blocks are the ideal tool to help them do so. To help them, adults need to provide:

Materials

Unit blocks (the sturdy wooden blocks in graduated sizes) are the most versatile. Though expensive, they are a lifetime investment if well cared for. You'll need about 30 blocks per child, or the 180 block set, to accommodate six children. Small play people, animals, or cars are useful accessories.

Space

A clear area out of traffic is crucial. A smooth carpet makes a stable foundation, softens the noise of accidental crashes and keeps small bottoms warmer. In day care homes an area about 8′ x 8′ can handle 2 or 3 children building; centers and classrooms need at least 9′ x 12′. (The carpeted area you use for group time is ideal!) Low open shelves near the area, with silhouettes of the various block sizes and shapes glued to shelves, will help children keep the space orderly.

Time

At least an hour of time in which children are free to select block play is essential. One and a half or two hours are better.

Support

An adult sitting on the floor on the block area makes an irresistible invitation to play there. From that vantage point as well, the adult can watch and listen as the children play out their ideas, and can offer suggestions to clarify or expand their concepts.

Conduct your own scientific experiments by combining these ingredients with active curious children and watch the discoveries blossom.

THINKING WITH TOYS

Dr. Alice Phipps Whiren, Associate Professor Family and Child Ecology Michigan State University

Science is essentially the process of answering questions about the nature of the world. Adults often think of science as the accumulation of correct answers for which other people have asked the questions. This is scientific knowledge and is useful, though the most important aspect to teach children is how to use scientific processes in daily life. Children's life experience encompasses their homes, schools, yards, and playgrounds. They can learn the process of asking and answering questions about the nature of things in these natural settings as well as with toys. Applying the following approach to toys is helpful to you as these are usually more conveniently located in your center or family day care home where you can encourage logical processes easily.

Children do not learn quickly to think scientifically. They don't think that events happen systematically for impersonal reasons. Instead, the young child thinks things happen by magic ("It just did" or "Because"), for personal reasons ("I wanted it to" or "I wished it"), or for reasons that are associated in time ("They had a baby cause they got a new house"), before they give real, impersonal reasons for events. In fact, with guidance, children learn to think more scientifically as they grow older. Children of six or seven usually attempt to discover the real reason events occur, though they still make wrong conclusions.

1. **Encourage children to explore the toys and materials.** They may smell, visually examine, poke their fingers into little holes and the like. Babies and toddlers are likely to taste toys as well. Explorations that do not damage children or the materials themselves are a natural way children find out about properties of objects. With younger children, comment on what they are doing ("You put your finger in the little hole"), or give information about the properties ("That's red" or "The edge of the truck is rough").

2. **Ask older children to observe more closely and to describe what they see.** Ask them to compare ("Look at the shape of the hole on the box. How is it different from the shape you are trying to put in it?" or "Find one just like this one"). Encourage them to describe ("Tell me how it feels", or "How are those the same? Different?"). If children do not have the vocabulary to answer questions about the material, the texture, color or shape, you may have to answer the question yourself. Accept any contribution the child makes. Usually they will try to make some reasonable descriptive comments such as "That's just like mama's coat" instead of saying "That's blue".

3. **Ask how something works and why it works that way.** Children can often make something work before they can tell you how it works. If a child has a pinwheel and has been playing with it a few minutes ask "What can you do with that? or "How does it work?" or "What else can it do?" Younger children are likely to just demonstrate, but four-year-olds should be able to give you some verbal description as well. Then ask the big question, "Why does it work?".

4. **Question children about other possibilities such as "What would happen if..."** Let the child try out possible answers. For examples with a Lego truck, "What would happen to the load if one wheel came off?" The child could make predictions and try them out to find out for sure.

5. **Help children to evaluate their thinking.** If the child said "nothing" would happen and then tried it with one wheel off, you could make comments that summarize and help him evaluate: "You thought that nothing would happen if the wheel came off. Did you guess right? What actually happened? Why do you suppose that happened?"

6. **Allow children to leave problems unsolved.** The goal is not always to find the answers but to use this questioning process to encourage thinking. Children need a lot of time and practice before they become skillful. Eventually they will begin to use these questions for themselves.

SCIENCE IN ART AND CREATIVITY

Anne L. Sheppard, Teacher
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Oakland County

Young children are naturally curious about their world. As adults observing children exploring and solving problems with open-ended materials in the art center, we see them take simple, unrelated items and combine them in unique ways to come up with something 'new'. Often children re-create or express some aspect of their environment that is important to them. They are actively involved in learning about themselves and the world they live in.

Presenting something new or novel in the art center triggers children's natural desire to explore and learn. In exploring, they learn about the object, what it can do, how it works and what they can do to it or with it.

Science and art involve a multitude of activities and processes enjoyed by young children. Some of these are experimenting, discovering, watching, investigating and comparing. They are all an integral part of play and learning through which children develop problem solving skills. Children need many opportunities to work through or incorporate these skills into their play experiences. The broader the range of materials provided, the more likely their interest will be whetted; then investigation and involvement will result. These behaviors occur in all areas of an early childhood program, but especially in the art and science center.

The art area offers children an opportunity to see what they can cause to happen. They find it pleasurable to see what they can do and what changes they can bring about by the action they take. The process is more important to young children than the end product.

The more children manipulate materials, such as paint or clay, the more likely they are to integrate the information into a meaningful concept. For example, in order for children to build a solid concept of paint, they need to work with it in many forms: thick fingerpaint, easel paint that is runny, powdered paint and water colors. As diverse paint experiences build on one another, children begin to fully understand what they can do with paint and they gain better control of the materials. At this stage children become more creative in their use of the paint or other media.

To encourage creativity and learning, the adult must make materials available and allow children the freedom to fully explore them. This means having a wide variety of art materials on shelves that children can see and use freely. Some of these must be purchased but many can be collected without cost. The children also need time, space and enouragement. Their work needs to be valued and accepted by the adults. Under these conditions children can be in charge of their own growth and learning.

ART MATERIALS THAT ENCOURAGE EXPLORATION

compiled by the Editorial Committee

Color
Tempera Paints
Watercolors
Non-toxic Markers
Crayons
Cray-Pas
Chalk
Charcoal
Fingerpaint
Water
**thicken paint that is too runny with soap flakes*
***mix evaporated milk with paint for a glossy shine.*

Instruments
Brushes-various sizes
Sponges
Tongue Depressors
Cotton Swabs
Cotton Balls
String
Pipe Cleaners
Straws
Fruits & Vegetables
Leaves
Spools
Marbles

Surfaces
Construction Paper
Manila Paper
Computer Paper
Tissue Paper
Newsprint
Wallpaper Samples
Styrofoam Trays
Cardboard
Milk Cartons
Table Top
Aluminum foil
Paper Towels

Sensory Materials
Salt
Instruments
Clay
Shaving Cream
Glitter
Sand
Silly Putty (1 part white glue + 1 part liquid *starch)*
Goop (cornstarch and water)
Flavoring Extract (for scents)
Seeds

Fixatives
White School Glue
Paste, Commercial
(Flour & Water)
Liquid Starch
Tape

LOPSIDED MUFFINS: COOKING UP A SCIENCE CURRICULUM

Tanya Vedder,
Child Care Specialist
Office for Young Children
Lansing

Cooking with children provides a variety of natural opportunities to teach science and math skills to the young child. Before you begin, prepare yourself for what lies ahead so you will be able to enjoy the experience. Know that involving children in food preparation will (at least at first) slow things down. It may be quicker to do it yourself but the lessons that can be learned make it worth the investment of your time. Remember that eye-hand coordination is still developing and spills and messes will happen. That's O.K.! Children also need to learn how to keep things orderly and how to clean up in order to become organized adults. Finally, don't expect perfect products. The muffins may be lopsided, the vegetables may be mauled instead of neatly sliced and diced and the tuna salad may end up in a lump on the center of squashed bread, but even the pickiest eaters will bravely try something they have helped create.

Some suggested cooking activities that will help develop science concepts are:

- *When cooking or baking, reserve a small uncooked portion of the food so the children can observe and compare.*
- *Compare density. Have the children weigh equal amounts of different foods. For example, which weighs more, one cup of corn flakes or one cup of margarine?*
- *Introduce estimation by having children estimate amounts of ingredients and then measure and see how close the estimate was.*
- *Discuss the different parts and function of fruits, vegetables, grains. Talk about roots, stems, leaves, fruit, seeds, flowers, pulp, skin, etc. Have children categorize fruits and vegetables according to which part of the plant they come from. Example: spinach is the leaf of the plant; carrots are the roots; celery is the stem; broccoli is the flower.*
- *Help children build a firm nutritional foundation by introducing them to the food groups. Discuss how many servings of each are required per day and how each group benefits the body. For more information contact your county home economist (through Cooperative Extension) or take a field trip to the library for some books on basic nutrition.*
- *Observe physical changes in food and discuss what caused the change. Examples: slice open a potato and watch for changes (the starch in the potatoes turns black when exposed to air). Refrigerate one small glass of milk and leave another on the counter all day, observe and discuss any differences or changes (do not let children taste the soured milk). Do the same with a small slice of fruit or vegetable overnight. Observe color changes in foods that are raw and the same food after cooking.*
- *Take advantage of mistakes. If a recipe flops, have the children try to figure out why.*
- *Allow plenty of time for observation and experimenting. Ask lots of open ended questions such as, "What do you think would happen if...?" or "Why do you think...?" Whenever possible let the children test their theories.*
- *Most importantly, keep it fun and relaxed.*

RESOURCES – SCIENCE

Dramatic Play:

Christie, J. f. & Yawkey, T. D., "Let's pretend! A guide to planning socio-dramatic play themes with your kids." *Scholastic Pre-K Today* (1987) 2 (2), 28-29.

Soloway, T., "Curriculum focus: Dramatic play — setting up." *Scholastic Pre-K Today,* 1987, 2 (3), 24-35.

Williamson, P. A. & Silvern, S. B., "Eliciting creative dramatic play: Classroom procedures." *Childhood Education,* 1986, 63 (4), 2-5.

Cherry, Clare *Creative Play for the Developing Child.* Fearon Publishers, Belmont, California.

Blocks:

Films and videotapes:

Blocks, a medium for perceptual learning, NAEYC.

A Classroom with Blocks, NAEYC.

Blocks, a material for creative play. Campus Films, 24 Depot Square, Tuckahoe, NY 10707 961-1900.

Books:

Bender, J. "Large hollow blocks: Relationships of quantity to block building behaviors." *Young Children,* (1978) 33 (6), 17-23.

Brown, J.. Block play and the growing child. *California Journal of Elementary Education,* (1942) 10, 177-192.

Cartwright, S. Blocks and Learning. *Young Children,* (1974) 29, 142-146.

Hirsch, E. S. (Ed.). *The Block Book* (rev. ed.). Washington, D.C.: NAEYC. (1984)

For those interested, the Department has *Heating with Wood, Safety Guidelines.* Publication #33. Available at no cost.

PROVIDER'S CORNER

CDA - FEELING GOOD ABOUT YOURSELF

Cathy Castagne,
Group Day Care Home Provider
Ingham County

As a teen I started babysitting, like a lot of people and continued as a young mother. I truly love kids and love working with them. This love showed in my relationship with the kids. But like others, I got tired of being just a babysitter — overworked, underpaid, and taken advantage of. In other words, I reached BURNOUT!!

I went to school to learn about computers. After all, it meant better hours and much more money. But I found that computers had one drawback — they can't hug you like a little one, let alone need you and depend upon you.

I returned to babysitting because I needed the kids as much as they needed me. My community needed good home day care and I had one to offer. Alas, the old burnout feeling returned again as well as the desire to return to school. These feelings were complicated by the fact that I now needed my income from babysitting.

My self esteem was low and I was not happy with myself. It was affecting me, my family and the other kids I loved. I happened to read an article about the Child Development Associate (CDA) national credentialing program, and decided that since I had a good set up I could probably get it with no problem and little work. It would be a good morale builder. After all, how hard could it be?

Surprise! It has involved work but I've enjoyed it all. I've made so many changes in my program and myself that I never thought possible. A lot of the preparation was mental. I learned to recognize that I am a professional child care provider and not just a babysitter!

The CDA program has 13 categories: Safety, Health, Learning Environment, Physical, Cognitive, Guidance, Communication, Creative, Self, Social, Families, Program Management and Professionalism.

I have learned so much and have made many changes in my thinking and in the way I do things. For every change I've made I have at least one other planned.

After learning to view myself with respect, I started thinking of myself as a professional. I've worked on being a small business with well kept records and have improved my management skills. I started taking classes, workshops and seminars, which have helped me to understand more the needs of kids and how I can better fulfill them.

I am awaiting my Local Assessment Team (LAT) meeting to see if I will be awarded my credential. Even though I feel confident that I will get it, I am willing to make any changes deemed necessary to be awarded the credential.

I no longer feel burned out. I am once again learning and maturing. My husband, who had been opposed to me taking classes and the extra work, can see the difference in me and is not objecting to anything. My teenage daughters tell me how much difference they see — I'm happier and look at things differently. More important then either of these is that I feel good about myself.

After my CDA what next? Who knows? I definitely want to continue taking at least one class a term so that I don't stagnate again. I love being a day care provider with my own business and will never ever be just a babysitter again.

P.S. I was granted my CDA effective September 1, 1988. I am grateful to the Office for Young Children (4C) and the Lansing Community College Staff who helped as well as my Advisor, Marcia Baris.

4C agencies have grants to assist providers who wish to go through the CDA process.

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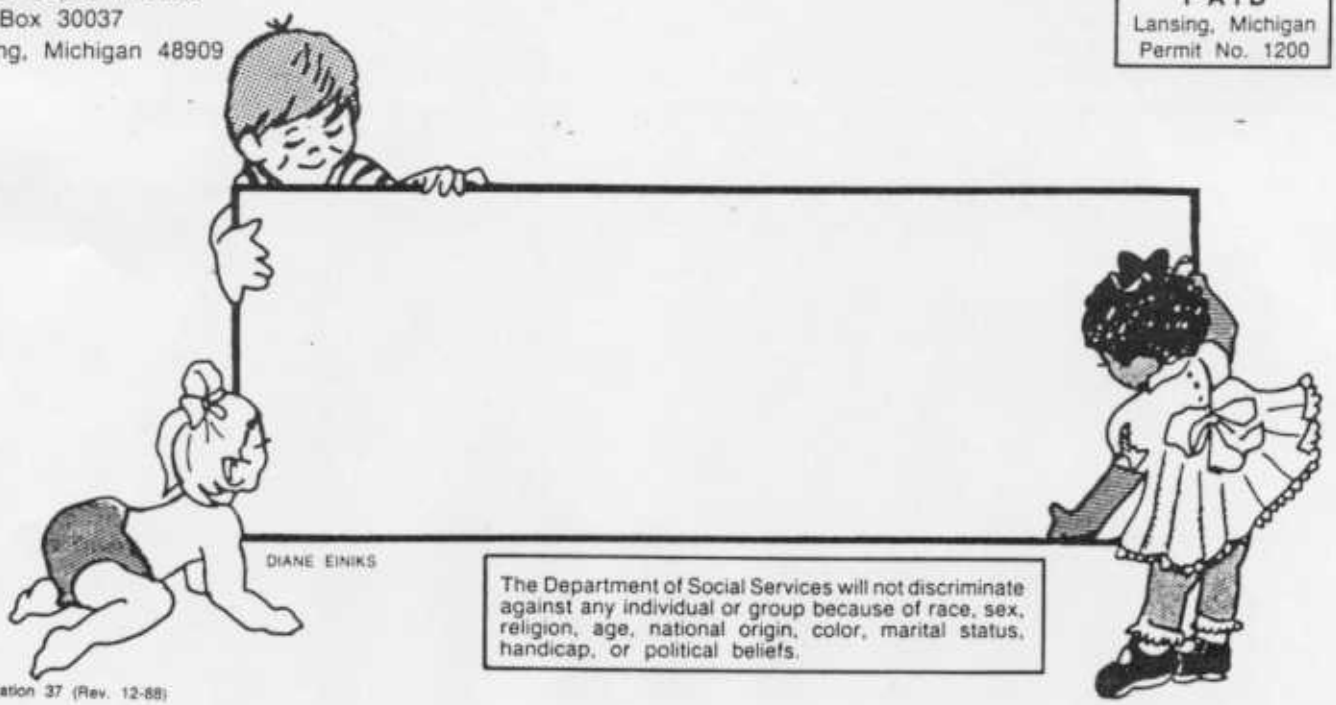

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